

**Amendments to the Claims:**

The listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently Amended) A plasma processing apparatus for effecting predetermined processing on a substrate by exposing the substrate to a plasma production region, comprising:
  - a chamber (1)-in which the substrate (15)-is introduced;
  - a top plate portion (5)-arranged above said substrate (15)-introduced in said chamber (1), and forming a part of a wall of said chamber-(1); and
  - an antenna portion (7)-supplying a high-frequency electromagnetic field into said chamber (1)-to form the plasma production region (17)-in a region between said top plate portion (5)-and said substrate (15)-located in said chamber-(1), wherein
    - said antenna portion (7)-includes a radial waveguide (17a)-having a predetermined inner diameter,
    - said chamber (1)-has a predetermined inner diameter in a portion containing said top plate portion (5)-and said antenna portion-(7), and
    - assuming that said radial waveguide (17a)-has the inner diameter of A, the portion containing said top plate portion (5)-and said antenna portion (7)-has the inner diameter of B, and the high-frequency electromagnetic field has a wave length of  $\lambda_g$  based on a composite dielectric constant resulting from a dielectric constant of said top plate portion (5)-and a dielectric constant of a space of the portion containing said top plate portion (5)-and said antenna portion-(7), the following formula is satisfied:

$$(B - A)/2 = (\lambda_g/2) \cdot N$$

where N is zero or a natural number.

2. (Currently Amended) The plasma processing apparatus according to claim 1, wherein

a portion of said chamber ~~(1)~~ opposed to a region for forming said plasma has a predetermined inner diameter, and

assuming that said region for forming the plasma has the inner diameter of C, the following formula is satisfied:

$$C \leq A$$

3. (Currently Amended) The plasma processing apparatus according to claim 2, wherein

said top plate portion ~~(5)~~ includes a dielectric material.

4. (Currently Amended) The plasma processing apparatus according to claim 1, wherein

said top plate portion ~~(5)~~ includes a dielectric material.